Subject index

Age-specific fecundity, 10
  Cervus elaphus, 17–18
  models for, 66–74
  Poa annua, 16, 72–4
Age-specific mortality-rate, 15
  classification, 18–20
  Poa annua, 16
Age-specific survivorship, 16
  Cervus elaphus, 17
Age states classification, 10–13
Aggregative behaviour, 137–44
  interference and pseudo-interference, 146–8, 155, 157
  mathematical model, 154
Allee effect, 51, 160
Allelopathy, 77
Amensalism, 77, 78, 101
Annual species, 6

b (competition/density parameter), 46–8
  definition, 46
Biennial species, 7–9
Buried seeds, 26–7, 198–9

Carrying-capacity (*K*), 53–4, 151
  definition, 31
  metapopulation models and, 210–12
Census data, 186, 188–90
Chaos detection, 60, 205–9
Character displacement, 98
Chicken pox, 209
Childhood diseases, 209
Clone, 13
Cloning (natural), 24
Cobwebbing, 65–6
Coexistence, 87–8, 95–8
  of *Asterionella* and *Synedra*, 104–5
  in carrion flies, 115–16
  habitat heterogeneity, and, 114–16
  in hermit crabs, 96–7
  Lotka–Volterra modelling and, 105–8
  in mud snails, 98
  niche overlap and, 112–14
  of *Panicum* and *Glycine*, 88
  in *Sedum* and *Minnartia*, 102–103
Cohort, 13
Colonization events, 210–12
Commensalism, 77
Community structure, 210, 216
Competition *see* Interspecific competition; Intraspecific competition
Competitive exclusion, 87, 90, 92–5
  Lotka–Volterra modelling and, 108
  see also Interspecific competition
Competitive release, 95
Conservation aspects, 214–15
Consumers *see* Predation
Continuous breeding model, 58–60
Cooperation in *Uria aalge*, 50–1
Cropping (harvesting), 165–74

Defoliation *see* Herbivores
Density-dependence
  delayed, 125, 190
  in
    Helianthus annus, 39–40
    Triticum aestivum, 40–1
    Vicia fabia, 39–40
  interspecific competition and, 83–9
  intraspecific competition and, 29–31
  predation and, 133–5, 155–60
  spatial, 187
  see also Regulation of population
Density-independence, 29, 177–8, 186
Desert ecology, 78–83
Differentiation, 59
Disturbance and community structure, 219–20
d_x-values, 15

Ecological neighbourhood area, 57
Ecological niche, 90–2
  niche overlap, 112–14
  versus habitat, 91
Extinction of populations, 210–16
  butterfly studies, 212–14

Fisheries research, 65, 167–8
  guppies, 172
  lobsters, 169
  sardines, 168, 169
  yellow fin tuna, 167, 169
Fluctuations in population size
  causes, 60–2
  examples, 62–5
  host–parasitoid models, 150–5
  intrinsic factor models, 60–2
  in plants, 191–200
  predator–prey patterns, 118–19
Food chains, 222
Food preference, 122–4
Food quality and predation, 132–3
Foraging strategies, 80–1
  predator–prey, 148–9
Fruit-eating herbivores, 127
Fungi, 77

Genet, 13
Genetic aspects, 200–1
Grazing system model, 160–4
Growth of organisms
  indeterminate/determinate, 38–9
  life cycles and individual size, 11
  modular, 21–5, 37
Guilds, 79

Habitat
  definition, 91
  habitat heterogeneity, 114–16
  size differences, 222–3
  versus ecological niche, 91
Handling time, 121–2, 134–7, 148–9
  mathematical model, 152
Harvesting, 165–74
  matrix models of, 173–4
  in structured populations, 170–3
Herbivores, 77, 117
  effect on plant fitness, 126–31
  see also Predation

Instability of community structure, 220–2
Interspecific competition, 77–116
  between
    algae species, 89–90
    barnacles, 92–4
    bumble bees, 94–5, 99
    flour beetles, 92
    fruitflies, 109–10

ISBN: 978-0-632-03478-9

Interspecific competition (*Cont.*)
granivorous ants, 78–83, 98
ground doves, 95
plant species, 83–90, 101–5, 110–12
tits, 99–100
wheat and *Bromus*, 84–5
wild oats, 85–7, 110–11
character displacement, 98
coexistence: in plants, 101–5
coexistence: resource partitioning, 95–8
community structure and, 216–17
competition avoidance, 98–101
competitive exclusion, 87, 90, 92–5, 108
competitive release, 95
ecological niche and, 90–2
habitat heterogeneity and, 114–16
logistic models, 105–10
niche overlap, 112–14
Intraspecific competition, 28–51
case studies, 33–50
Lucilia cuprina, 165–6
characteristics, 29–31
in host–parasitoid systems, 151
negative competition, 50–1
scramble and contest, 31–2, 50
single-species models, 52–74
Inverse density-dependence, 153, 155–6
Island biogeography theory, 210, 214–16
Island habitats, 222–3
Iteroparous species, 20

K (carrying-capacity), 53–4, 151
definition, 31
metapopulation models and, 210–12
Killing-power *see* k-values
k-values, 15
Colarado beetle study, 182–6
competition experiments, 64
intraspecific competition and, 31–7, 47, 55

Leslie matrix model, 69–72
practical application, 173–4
Life cycles, 6–10
Aleurotracheus jelinekii, 187–8
Poa annua, 72
Life-tables
analyses, 186–8
Colorado beetle, 181–6
conventional, 13–18
diagrammatic, 5–13, 68
Linear recurrence equations, 69
Logarithms, use of, 16–17
Logistic equation, 59–60, 61
Lotka–Volterra models, 105–8, 149, 222
l_x-values, 15

Mathematical models
age-specific fecundity, 66–74
continuous breeding, 58–60
grazing systems, 160–4
interspecific competition, 105–10
intraspecific competition, 52–74
Lotka–Volterra, 105–8, 149, 222
metapopulation, 210–12
population regulation, 185–6
predation, 149–64
usefulness of, 52
see also Matrix modelling
Matrix modelling, 69
harvesting, 173–4
single-species populations, 69–72
m (coefficient of interference), 145–6
Ephestia and *Venturia*, 146–7
Measles, 209
Metapopulation, 210–16
Models *see* Mathematical models; Matrix modelling
Monocarpic fluctuations, 20
Mutual interference by predators, 144–8
mathematical modelling, 155, 157
Mutualism, 77–8

Nature reserve design, 214
Niche
ecological niche, 90–2
niche differentiation in plants, 101–4
niche overlap, 112–14
Nicolson–Bailey model, 150–5

Optimal foraging, 148–9

Parasites, 77, 117, 121
host immune responses, 146
parasite–host distributions, 137–8
predation-rates, 126
Spilopsyllus cuniculi, 124
see also Predation
Parasitoids, 117, 121, 156–60
host–parasitoid models, 150–5, 208
predation-rates, 126
Patchiness of prey distributions, 143–4
optimal foraging, 148
parasitoid–host density and, 156–60
Polycarpic fluctuations, 20
Predation, 77, 117–74
abundance patterns, 118–19
community structure and, 217–19
harvesting, 165–74
mathematical models, 149–64
optimal foraging, 148–9
predator coevolution and specialization, 119–24
predator fitness, 131–3
predator interference/pseudo-interference, 144–8, 155, 157
prey availabilty, 133–7
prey fitness and, 125–31
stabilizing factors, 164–5
timing aspects, 124–5
Predation-rate
aggregation and, 137–44
effect on predator fitness, 131–3
effect on prey fitness, 125–31
foraging strategies and, 148–9
mutual predator interference, 144–6
prey density and, 133–7

q_x-values, 15

Rainforests, 214–15, 220
Ramet, 13
Refuges for prey, 138–9
mathematical modelling and, 154
partial refuges, 139–40
Regulation of population, 29–31, 177–209
Andrewartha and Birch's view, 177–8
chaos detection, 60, 205–9
Colorado beetle, 181–6
genetic change, 200–1
Nicholson's view, 177
in plants, 191–200
space capture, 104, 203–5
territoriality, 201–3
Thrips imaginis, 178–80
in vertebrates, 190–1
see also Density-dependence; Metapopulation
Relative yield totals, 87–8
for *Panicum* and *Glycine*, 88
Reproduction-rate, population size and, 201
R (net reproductive rate)
definition, 52

of *Poa annua*, 74
Rothamsted Insect Survey, 189

Saprophytism, 77
Search efficiency of predators, 142, 147
host–parasitoid models, 150
Seed banks, 7–9, 195
buried, 26–7, 198–9
granivorous ants study, 78–83, 128
seed-eating animals, 127
Self-thinning in plants, 43–8
in *Agrostemma githago*, 64
Semelparous species, 20
Size
habitat size differences, 222–3
life cycles and individual size, 11
see also Fluctuations in population size
Skewed populations, 42
Space capture, 104, 203–5
Survivorship curve, 16
of *Phleum pratense*, 25

Territoriality, 201–3
in birds, 191, 201–2, 203
in plants, 104, 203–5
Time-lags
population fluctuations and, 61–2
in predator–prey interactions, 125
Transition matrices *see* Matrix modelling

Yields
intraspecific competition and, 37
relative yields, 87–9
yield-density models, 56–8
yield-density relationships, 39–42